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(54) Abstract Title

Round or oval shaped container for use in conventional or microwave ovens

(57) A food container, capable of being used at 220°C in either a conventional oven or a microwave oven, comprises a round (eg oval) base part 1 and a side wall part 2 formed of a sheet of material curved around a central axis 11 of the container. Both parts are made of a board material 3 with a layer of crystalline polyester material (4, 5, 7, 8, fig 2), which may be crystalline polyethyleneterephthalate (CPET), on at least one face. The ends of the side wall portion (2A, 2B, fig 3) are overlapped and heat sealed together, and the side wall itself is heat sealed to a peripheral flange 10 of the base part. This may be achieved by having a "U" shaped portion on the lower end of the side wall so that the peripheral flange of the base extends downwardly, and is sealed, between the opposite limbs of the "U" (see fig 2). Preferably the side wall defines a frusto-conical surface of the container wider at the top than at the base. There may be provided a film across the open end of the container that is heat sealed to the top of the rim 12 of the side wall, and also a closure member over the top of the film.

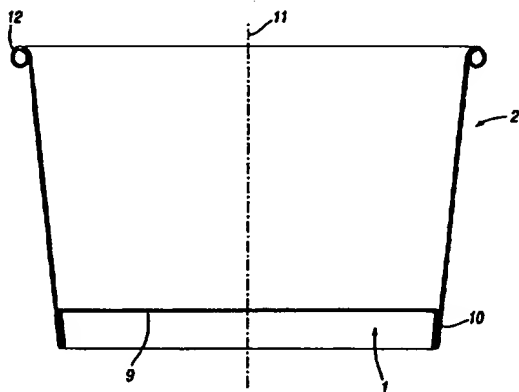


Fig.1

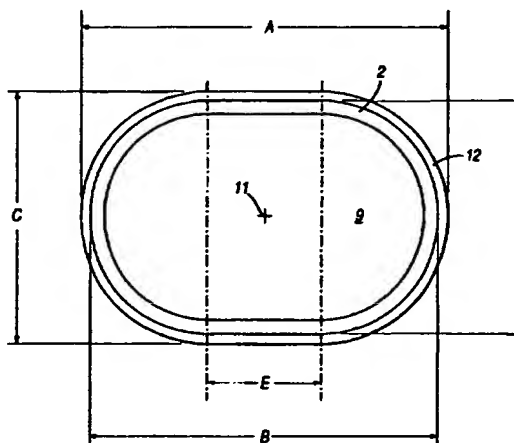


Fig.4

Fig. 1

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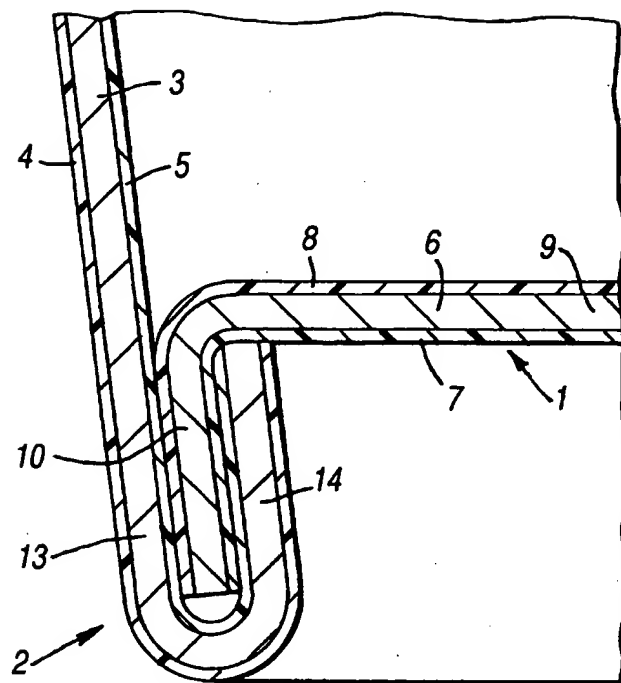


Fig. 2

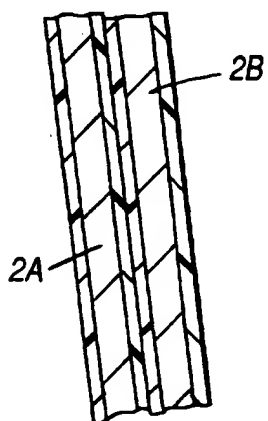


Fig. 3

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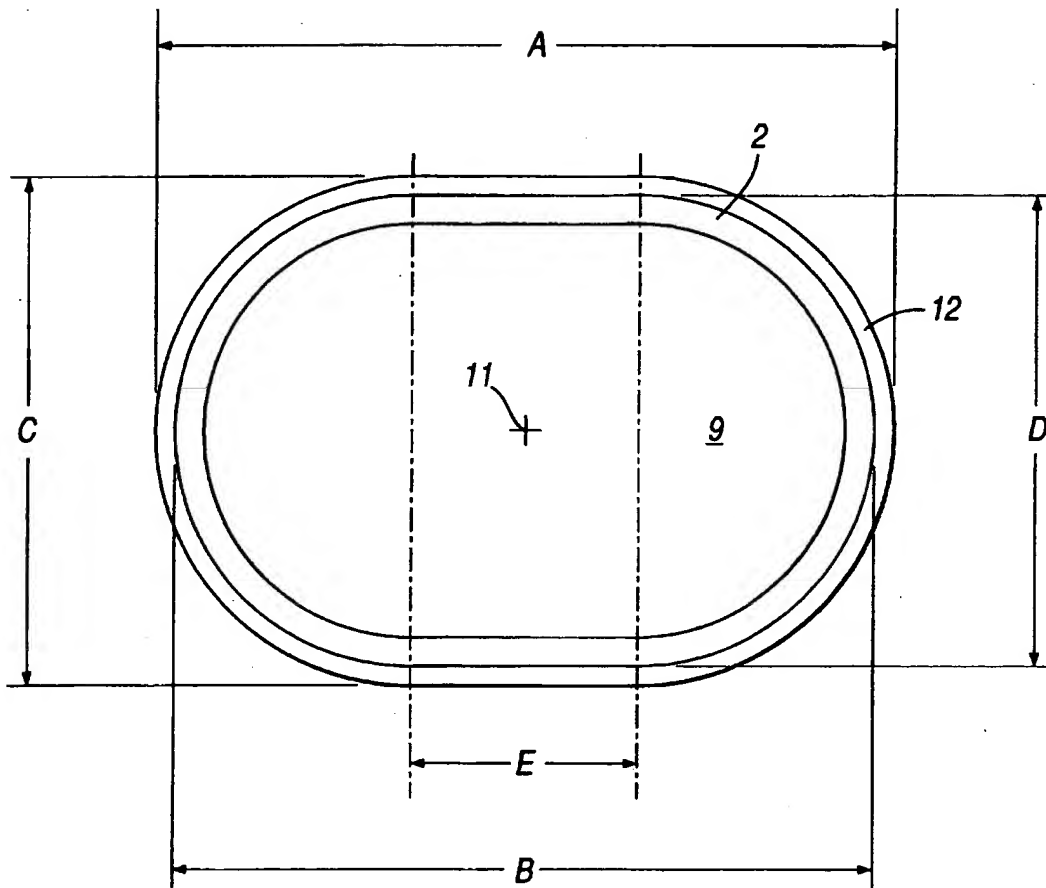


Fig.4

Food Container

This invention relates to a food container and more particularly to a food container that is dual ovenable.

When a container is referred to in this specification
5 as dual ovenable it is capable of being used either in a microwave oven, or in a conventional oven at a temperature of 220°C, for heating food in the container, whilst maintaining the functionality of the container. That does not mean that the container is necessarily always to be
10 filled with food that is intended to be cooked, or even is capable of being cooked, in whichever oven a user may choose; sometimes a supplier of a dual ovenable container may instruct a user to place the container in a microwave oven and not provide any alternative instructions for a
15 conventional oven; such a container is still "dual ovenable" as defined in the present specification provided that the container maintains its functionality when placed in a conventional oven at a temperature of 220°C.

The functionality of a container comprises its
20 ability not to allow significant leakage of liquid, its ability to have sufficient structural strength to withstand normal handling, and, when there is food in the container, its ability not to contaminate the food, for

example, by excessive migration of one or more substances from the container into the food.

There are a multitude of existing designs of food container, some made entirely of plastics material, some
5 made entirely of board material and others made of a combination of layers of plastics and board material. When a container is made entirely of plastics material it is usual for the shape of the container to be defined at the same time as the material is converted into its final
10 form, for example in a moulding process. On the other hand when a container is made partly or wholly of board material, it is usual for the board to be formed as a flat sheet and subsequently folded and/or curved into its desired shape.

15 A common kind of material for forming a food container is one that comprises a combination of a board material and a layer of plastics material on the board material. For example tubs formed from a combination of board and polyethylene are used as containers for ice
20 cream or yoghurt. WO 96/36546 describes a food container with a side wall formed from a paperboard material coated on both faces with polyethylene. The layer of plastics material is able to prevent the ingress of liquid contents of the container into the board material and can also
25 easily be heat sealed so that in the assembled container

adjoining parts of the container body are sealed together effectively. Containers of the kind just described have been well known for many years but they are also well known not to be dual ovenable.

- 5 According to the invention there is provided a food container comprising a bottom part and a side wall part, each formed from material comprising a board material on at least one face of which there is a layer of plastics material, the bottom part being of round shape when viewed
10 from above and having a peripheral flange extending from the periphery of the round bottom part, the side wall part being formed from a sheet of material that is curved around a central axis of the container with one side edge of the sheet being at the bottom of the container and the
15 other side edge of the sheet being at the top of the container, the ends of the sheet overlapping and being heat sealed to one another, the side edge portion of the sheet at the bottom of the container being heat sealed to the peripheral flange of the bottom part of the container,
20 wherein the layer of plastics material on the board material comprises a crystalline polyester material and the food container is capable of being used either in a microwave oven, or in a conventional oven at a temperature of 220°C, for heating food in the container, whilst
25 maintaining the functionality of the container.

For a dual ovenable container formed of a combination of a board material and a layer of plastics material it is well known to form what is commonly referred to as an ovenable tray, having a rectangular base portion and four
5 side wall portions upstanding from the base portion. Such a tray can be formed from a single blank of sheet material which is then folded into the desired form; fold lines are provided at the junctions of the side wall portions with the base portion and also at the junctions of the side
10 wall portions with one another. Maintaining the leakproof quality of the container may be achieved by the folding arrangement that is chosen and/or by heat sealing overlapping portions of the container. The heat sealing of overlapping portions of the container can, by virtue of
15 the shape of the container, be along a planar interface making it much easier to achieve an effective seal; also, there need be no reliance on a leakproof seal to keep the container leakproof. Consequently it has been common practice to use crystalline polyethyleneterephthalate as a
20 layer of plastics material on the board material. The crystalline polyethyleneterephthalate is able to withstand the temperatures of a conventional domestic oven and, although harder to heat seal than amorphous material, can be heat sealed reliably along the planar interfaces that
25 are required to be sealed. Such containers are entirely

satisfactory when a rectangular interior is desirable, but for some applications round containers are preferred; in round containers the interfaces to be sealed cannot be planar and round containers are not made in this way.

5 Thus the invention, in contrast to the common practice of many years, provides a dual ovenable container formed from a bottom wall part and a side wall part, each formed from material comprising a board material on at least one face of which there is a layer of plastics material, the plastics material being a crystalline polyester material and the parts being heat sealed together. Such a combination of using a board material and crystalline polyester layer for a round food container that is formed from separate side wall parts and bottom parts is original even in the crowded art of containers and even though other forms of container using a board and crystalline polyester layer are well known. The combination makes it possible to provide a dual ovenable food container having the advantages of a board container yet having a round cross-section when sectioned horizontally. The crystalline polyester may take various forms, including for example being a copolyester, and may include a significant amount of amorphous material. Also the form of the polyester material need not be consistent throughout a layer; for example the degree of

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crystallinity may vary and/or a minor part may even be amorphous provided that the overall nature of the material is that of a crystalline material so that the container is able to maintain its functionality when placed in a
5 conventional oven at 220°C. Preferably, the crystalline polyester is crystalline polyethyleneterephthalate.

Preferably, the side edge portion of the side wall part at the bottom of the container is of "U" shaped cross-section with the peripheral flange of the bottom
10 part of the container extending downwardly and being received between the opposite limbs of the "U". Such an arrangement provides a strong mechanical connection between the side wall part and the bottom part and also enables a good seal to be obtained. It is possible for
15 only one of the inner and outer faces of the peripheral flange to be heat sealed to the side edge portion of the side wall part but preferably both inner and outer faces of the peripheral flange are heat sealed to the side edge portion of the side wall part.

20 Preferably there is a layer of polyester material over both faces of the board material of the bottom part and preferably substantially the same polyester material is over both faces. The thickness of each layer of polyester material is preferably also substantially the
25 same. Whilst it is possible for other layers to be

provided, it is preferable that the bottom part comprises three layers only, one layer being the board material and the other two layers being the layers of polyester material.

5 There may be a layer of polyester material over only the inner face of the board material of the side wall part. In that case the side wall part preferably comprises two layers only, one layer being the board material and the other layer being the layer of polyester
10 material.

 Alternatively, there may be a layer of polyester material over both the inner and outer faces of the board material of the side wall part and preferably substantially the same polyester material is over both
15 faces. The thickness of each layer of polyester material is preferably also substantially the same. In this case, the side wall part preferably comprises three layers only, one layer being the board material and the other two layers being the layers of polyester material.

20 The container is preferably of substantially oval cross-section, or of circular cross-section, when sectioned horizontally; in an embodiment of the invention described below with reference to the drawings the oval shape comprises two arcuate end portions joined by
25 straight side portions. It will be appreciated, however,

that other round shapes of container are also possible and that the term "round" is used herein to refer to a shape that is devoid of angular corners but not necessarily even approximately circular. Preferably the container is of
5 substantially frusto-conical shape, being wider at the top than at the bottom.

In normal use, a lid is required and the container preferably further includes a lid.

The nature of the lid arrangement most suitable for
10 the container will depend upon the nature of the food that is to be placed in the container and how it behaves during cooking. In certain applications it will be desirable, after filling the container with food, to heat seal a film lid over the top of the container. Thus the container may
15 further include food in the container and a film lid of plastics material extending over the top of the container and heat sealed to the side wall part of the container. The container may further include a closure member over the top of the film lid and mechanically secured to the
20 top of the side wall part of the container. The closure member may include a central cover part of sheet material including board and a peripheral securing part which is of plastics material and which mechanically secures the central cover part over the top of the film lid.

As previously discussed, the fact that the container maintains its functionality when used in a microwave oven or when used in a conventional oven does not necessarily mean that a user is invited to choose either cooking apparatus. Indeed, even though the container is dual ovenable, it may be that the food in the container is not; for example the food may be suitable for heating in a microwave oven but not in a conventional oven; preferably, however, the food is suitable for heating in the container either in a microwave oven or in a conventional oven.

By way of example, an embodiment of the invention will now be described with reference to the accompanying drawings, of which:

- 15 Fig. 1 is a sectional side view of a dual ovenable food container comprising a bottom part and a side wall part,
- Fig. 2 is a sectional view through the junction of the side wall part and the bottom part of the container of Fig. 1,
- 20 Fig. 3 is a sectional view through the side wall part of the container of Fig. 1, and
- Fig. 4 is a top view of the container of Fig. 1.
- Referring to the drawings, the dual ovenable
- 25 container shown therein comprises a bottom part 1 and a

side wall part 2. As can be seen in Fig. 2, each of the bottom part 1 and the side wall part 2 is formed from three layers of material: the side wall part 2 is formed with a middle board layer 3 on the outside of which is an outer layer 4 of crystalline polyester material, in this example crystalline polyethyleneterephthalate (CPET), and on the inside of which is an inner layer 5 of CPET; similarly the bottom wall is formed with a middle board layer 6 on the outside of which is an outer layer 7 of CPET and on the inside of which is an inner layer 8 of CPET.

The bottom part 1 and the side wall part 2 are in this particular example formed from the same material, namely one which is already used in the fabrication of dual ovenable trays. The board that forms the board layers 3 and 6 is virgin board and the thickness of the board layers is typically in the range of 350 to 500 microns. The polyester material that forms the layers 4, 5, 7, 8 is crystalline polyethyleneterephthalate having a melting point (peak) of greater than 220°C; the thickness of the layers of plastics material is typically of the order of 15 to 60 microns. An example of a suitable material is the Dupont polyester sold under the trade name Melinar. That material has a melting point (peak) of 250°C.

The bottom part 1 of the container has a flat, oval, base 9 around the periphery of which there is a downwardly extending flange 10 of uniform height around the base 9. The side wall part 2 is of frusto-conical shape, being wider at the top than at the bottom and is of oval cross-section when sectioned horizontally; thus, the container as a whole is also of this shape. The side wall part 2 is formed from a flat sheet of material that is curved around a central axis 11 of the container with one end 2A of the sheet overlapping the opposite end 2B of the sheet; the overlapping ends 2A and 2B are heat sealed together. The side wall part 2 has a side edge portion at the top of the container which is rolled over in a manner known per se to form an outwardly projecting rim 12, and a side edge portion at the bottom of the container which is of "U" shaped cross-section with the peripheral flange 10 of the bottom part 1 received between an outer limb 13 and an inner limb 14 of the "U" as shown in Fig. 2. The inner layer 5 of the outer limb 13 of the side wall part 2 is heat sealed to the inner layer 6 of the bottom part 1 and the inner layer 5 of the inner limb 14 of the side wall part 2 is heat sealed to the outer layer 6 of the bottom part 1. The end of the flange 10 may also be heat sealed to the inner layer 5 at the bottom of the "U" formed by the limbs 13 and 14. The heat sealing of both of the

limbs 13 and 14 to the flange 10 could be viewed as excessive but is useful in ensuring that the joint between the side wall part 2 and the bottom part 1 is leakproof; the two sealing interfaces between the parts are frusto-
5 conical, which makes the achieving of an effective heat seal with CPET more difficult, but with the illustrated arrangement even if there were a portion of one interface where a good seal was not achieved that would not be problematic provided that in the adjacent region of the
10 other interface a good seal was achieved.

The container is shown in the drawings without a lid of any kind. In practice, of course, when food has been placed in the container a lid of some kind will be provided, the form of the lid depending on the food in the
15 container. In a particular example of the invention described below the food in the container is a fish sauce for pasta or potatoes and in that example the container is provided with a film lid extending across the top of the container and heat sealed to the top of the rim 12 of the
20 side wall part 2; there is also provided a closure member over the top of the film lid, the closure member having a peripheral downwardly extending flange with an inwardly directed projection at its bottom that engages under the rim 12 to retain the closure member on the container. The
25 closure member includes a central cover part of a board

material and a peripheral receiving part which holds the central cover part and engages the rim 12, mechanically securing the closure member to the container.

In the particular example of container described, the overall height of the container is 65 mm, and the height of the base 9 above the bottom edge of the side wall part 2 is 8 mm. As best seen in Fig. 4, the container is of oval shape and the dimensions marked A, B, C, D and E in Fig. 4 are as follows:

10	A:	152 mm
	B:	144 mm
	C:	104 mm
	D:	96 mm
	E:	48 mm

15 It will be understood that the dimension E is the length of the straight portions of the top edges of the side wall part 2.

As already indicated the container is suitable for heating food either in a microwave oven or in a conventional oven. In a particular example of the invention the container is filled with a fish sauce for pasta or potatoes, the fish sauce comprising raw fish and blanched vegetables in a cooked sauce. The container is supplied to a customer with the food frozen and an amount of 410g food in the container. The container is sold with

a film lid, which may be formed of a polyester material, heat sealed to the rim 12 and with a further closure member secured over the film lid. A user is instructed that, prior to heating, the closure member should be removed, the film lid peeled off and the closure member replaced loosely. The user is then able to heat the container with the contents frozen in one of the following ways:

1. By placing the container in a Category D (750W) microwave oven on full power for 8 minutes, removing the container from the oven, stirring the contents after they have stood for one minute and replacing the container in the same oven on full power for a further 2½ minutes.
- 15 2. By placing the container in a Category B (650W) microwave oven on full power for 8 minutes, removing the container from the oven, stirring the contents after they have stood for one minute and replacing the container in the same oven on full power for a further 20 5 minutes.
3. By placing the container in a conventional oven at 200°C for 50 minutes, removing the container from the oven to inspect the product and replacing the container in the oven at 200°C for, say, 10 minutes, this second

time being chosen according to the result of the inspection.

During heating the fish is cooked and the contents of the container maintained at ambient pressure by passage of
5 gases or vapours between the closure member and the container. The functionality of the container is maintained throughout either kind of oven treatment: the heat sealing of the side wall part 2 and the bottom part 1 remains intact, the mechanical properties of the container
10 are substantially unaltered and there is no significant contamination of the food by the container.

Whilst one particular example of the invention has been described with reference to the drawings, it will be understood that many modifications may be made. For
15 example, in the illustrated example the side wall part 2 has both an inner layer 5 and an outer layer 4 of CPET; an alternative possibility is for only the inner layer 5 to be provided and it will be seen that the omission of the outer layer 4 does not affect the sealing arrangement
20 between the bottom part 1 and the side wall part 2; if it were desired to omit the outer layer 4 and yet still have CPET layers on the abutting overlapping ends of the side wall part 2, that could still be achieved by adopting the process known as skiving and hemming for the inner end 2B
25 of the side wall part 2 so that in the region of that end

there is still a CPET layer on both faces of the side wall part 2. An advantage of omitting the outer layer 4 of the side wall part 2 is that the exterior side face of the container is then board material on which it is

5 straightforward to provide high quality print; similarly if the lid arrangement is of the form described above, it is straightforward to provide high quality print on the top of the closure member. Thus the invention makes it possible to provide a round dual ovenable food container

10 of a striking appearance.

In the particular example of the invention described above, some of the food in the container is raw and some is cooked, and the heating step therefore involves some cooking. It should be understood, however, that in other

15 embodiments of the invention all the food in the container may be cooked during the heating step, all the food may be cooked by the time it is placed in the container so that the heating step serves only to raise the temperature of the food, or the food may be cooked in the container

20 before the container with the food is supplied to a customer.

Claims:

1. A food container comprising a bottom part and a side wall part, each formed from material comprising a board material on at least one face of which there is a layer of plastics material, the bottom part being of round shape when viewed from above and having a peripheral flange extending from the periphery of the round bottom part, the side wall part being formed from a sheet of material that is curved around a central axis of the container with one side edge of the sheet being at the bottom of the container and the other side edge of the sheet being at the top of the container, the ends of the sheet overlapping and being heat sealed to one another, the side edge portion of the sheet at the bottom of the container being heat sealed to the peripheral flange of the bottom part of the container, wherein the layer of plastics material on the board material comprises crystalline polyester material and the food container is capable of being used either in a microwave oven, or in a conventional oven at a temperature of 220°C, for heating food in the container, whilst maintaining the functionality of the container.

2. A container according to claim 1, in which the crystalline polyester material is crystalline polyethyleneterephthalate.
3. A container according to claim 1 or 2, in which the
5 side edge portion of the sheet at the bottom of the container is of "U" shaped cross-section with the peripheral flange of the bottom part of the container extending downwardly and being received between the opposite limbs of the "U".
- 10 4. A container according to claim 3, in which both inner and outer faces of the peripheral flange are heat sealed to the side edge portion of the side wall part.
5. A container according to any preceding claim, in which there is a layer of polyester material over both
15 faces of the board material of the bottom part.
6. A container according to claim 5, in which substantially the same polyester material is over both faces of the board material of the bottom part.
7. A container according to claim 5 or 6, in which the
20 bottom part consists of three layers only, one layer being the board material and the other two layers being the layers of polyester material.
8. A container according to any preceding claim, in which there is a layer of polyester material over only the
25 inner face of the board material of the side wall part.

9. A container according to claim 8, in which the side wall part consists of two layers only, one layer being the board material and the other layer being the layer of polyester material.
- 5 10. A container according to any one of claims 1 to 7, in which there is a layer of polyester material over both the inner and outer faces of the board material of the side wall part.
11. A container according to claim 10, in which
- 10 substantially the same polyester material is over both faces of the board material of the side wall part.
12. A container according to claim 10 or 11, in which the side wall part consists of three layers only, one layer being the board material and the other two layers being
- 15 the layers of polyester material.
13. A container according to any preceding claim, in which the container is of oval cross-section when sectioned horizontally.
14. A container according to any preceding claim, in
- 20 which the container is of substantially frusto-conical shape, being wider at the top than at the bottom.
15. A container according to any preceding claim, further including a lid.
16. A container according to any one of claims 1 to 14,
- 25 further including food in the container and a film lid of

plastics material extending over the top of the container and heat sealed to the side wall part of the container.

17. A container according to claim 16, further including a closure member over the top of the film lid and
- 5 mechanically secured to the top of the side wall part of the container.
18. A container according to claim 17, in which the closure member includes a central cover part of sheet material including board and a peripheral securing part
- 10 which is of plastics material and which mechanically secures the central cover part over the top of the film lid.
19. A container according to any one of claims 1 to 15, further including food in the container.
- 15 20. A container according to any one of claims 16 to 19, in which the food is suitable for heating in the container either in a microwave oven or in a conventional oven.
21. A food container substantially as herein described with reference to and as shown in the accompanying
- 20 drawings.



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Claims searched: 1-21

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Gareth Prothero
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Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): B8P (PK9, PK14); B8D (DCW9, DCD, DCE); H5H HMK

Int Cl (Ed.6): B65D 25/14, 81/34

Other: Online: WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2239378 A (EDENFIELD) see whole document.	1, 2, & 4-13
Y	WO 96/36546 A1 (GOLDEN) see abstract, and figs 1 and 2.	1-12, & 14-21
Y	US 4387551 A (COWAN) see abstract, col 1, line 56, to col 2, line 6, and col 4, lines 5 to 10.	1-12, & 14-21

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